



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/711,721	09/30/2004	Cory Wajda	TTCA-002	5720

37694 7590 01/10/2007
WOOD, HERRON & EVANS, LLP (TOKYO ELECTRON)
2700 CAREW TOWER
441 VINE STREET
CINCINNATI, OH 45202

EXAMINER

GHYKA, ALEXANDER G

ART UNIT	PAPER NUMBER
----------	--------------

2812

SHORTENED STATUTORY PERIOD OF RESPONSE	NOTIFICATION DATE	DELIVERY MODE
3 MONTHS	01/10/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 01/10/2007.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

dgoodman@whepatent.com
usptodock@whepatent.com

Office Action Summary

Application No.

10/711,721

Applicant(s)

WAJDA, CORY

Examiner

Alexander G. Ghyka

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

ALEXANDER GHYKA
PRIMARY EXAMINER

Av 2812
Alex Ghyka

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 September 2004 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- ☐ Notice of Informal Patent Application
- ☐ Other: ____.

DETAILED ACTION

Election/Restrictions

The restriction requirement of the previous Office action is withdrawn in view of Applicants' arguments. Claims 1-21 are now under consideration.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-9, 16-19 and 21 are rejected under 35 U.S.C. 102(b) as being anticipate by Rotondaro et al (US 2003/0109106).

Rotondaro et al disclose a method for forming a thin high k layer comprising providing a substrate in a process chamber, depositing a high k material to at least a minimum thickness to form a thick complete high k layer on the substrate; and thinning the thick complete high k layer to a desired thickness less than the minimum thickness to form a thin complete high k layer, as required by present Claim 1. See page 2, paragraphs 21 and 22. Rotondaro et al disclose hafnium oxide as required in Claims 2, 17-19 and 21 (see page 2, paragraph 21), the thicknesses as required by Claims 3-4, 6-7 and 18-19 (see page 2, paragraphs 22-23), and a CVD process as required by Claims 5 and 17 (see page 2, paragraph 22). Moreover, Rotondaro et al disclose an interface comprising oxide as required by present Claims 8 and 9. See page 2, paragraph 19.

Furthermore, Rotondaro et al disclose a wet etch as required by present Claim 21. See Figure 1. Therefore, the Claims at hand are anticipated in view of the Rotondaro et al reference.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 6, 10-14 and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Bease et al (US 2004/0129674).

Bease et al disclose a method for forming a thin high k layer comprising providing a substrate in a process chamber, depositing a high k material to at least a minimum thickness to form a thick complete high k layer on the substrate; and thinning the thick complete high k layer to a desired thickness less than the minimum thickness to form a thin complete high k layer, as required by present Claim 1. See page 4, paragraph 54. Bease et al further disclose the use of hafnium oxide as required by Claim 2, and the thicknesses as claimed by Claims 3-4. See page 4, paragraphs 54-55. With respect to Claims 10-14, Bease et al disclose plasma processing with the gases as Claimed. See page 5, Table 1 and Claims 3-9 of Bease et al. With respect to Claim 16, Bease et al

Art Unit: 2812

disclose wet etching. See page 1, paragraph 16. Therefore, Claims 1-4, 6, 10-14 and 16 are anticipated.

Claims 1- 6, 8, 10 and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Egger et al (US 2004/105213).

Egger et al disclose a method for forming a thin high k layer comprising providing a substrate in a process chamber, depositing a high k material to at least a minimum thickness to form a thick complete high k layer on the substrate; and thinning the thick complete high k layer to a desired thickness less than the minimum thickness to form a thin complete high k layer, as required by present Claim 1. See page 2, paragraph 27-28. Egger et al disclose the use of aluminum oxide, the thicknesses as required by Claims 3-4, and sputtering which is a type of physical vapor deposition. See page 2, paragraphs 27-28. With respect to Claims 10 and 15, Egger et al disclose a reactive ion etching process to thin the dielectric. See page 1, paragraph 17. Therefore, Claims 1-6, 8, 10 and 15 are anticipated by the Egger et al reference.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rotondaro et al or Bease et al as applied to claim 16 above, and further in view of Egger et al (US 2004/105213).

Rotondaro et al or Bease et al are relied upon as discussed above. Both references, as discussed above pertain to thinning a dielectric layer.

However, neither reference discloses thinning the dielectric layer by using a reactive etching process.

Egger et al is relied upon as discussed above. Moreover, Egger et al disclose a reactive ion etching process to thin the dielectric. See page 1, paragraph 17.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to use a reactive ion etch in a process as disclosed by Rotondaro et al or Bease et al, for its known benefit in the art of thinning dielectric layers as disclosed by Egger et al. The use of a known process, reactive ion etching, for its known benefit,

Art Unit: 2812

thinning a dielectric, is *prima facie* obvious, as all of the references pertain to thinning dielectric layers. As such, it would be obvious to use the reactive ion etch of Egger to thin the dielectric layers of Rotondaro et al or Bease et al, in view of the disclosure of Egger et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander G. Ghyka whose telephone number is (571) 272-1669. The examiner can normally be reached on Monday through Friday during general business hours.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2812

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AGG
January 2, 2006

ALEXANDER GHYKA
PRIMARY EXAMINER

A02812

A handwritten signature in cursive script, appearing to read 'Alex Ghyska', written in black ink.